



ZipCenterTM

User Manual



ASG

AUTOMATED SOLUTIONS GROUP



ZipCenterTM

User Manual



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Using the ZipCenter Manual

The ZipCenter package includes three components:

- ◆ 5-digit ZIP Code lookups in an external file.
- ◆ Area searches.
- ◆ Current 5-digit ZIP Code data.

The “About ZipCenter” chapter provides an overview of the ZipCenter package. The individual components are described in their own chapters. Each chapter begins with an overview of the topic, and how to use the different commands. Each command is then covered in detail, and examples provided.

If you are having troubles with ZipCenter, review the “Troubleshooting” chapter. If you are unable to resolve a problem using this manual, you can contact our Technical Support Department, as discussed in “Technical Support”.

Cross-Referencing Format

Each time a command is used, a cross-reference is given in parenthesis to let you quickly find the definition for the command.

The Online PDF Version of the Manual

The PDF version of this manual lets you view the manual using Adobe Acrobat Reader. While viewing the manual, you can click on any cross reference to jump immediately to the referenced page. These hypertext-style jumpers are available for all cross references, the Table of Contents, Index, and command listings.

Command Lists

“ZipCenter Command Reference — by Chapter” lists ZipCenter commands by chapter. “ZipCenter Command Reference — Alphabetical” lists ZipCenter commands alphabetically. These lists include the parameters for each command, and the page number for the command definition.

Command Descriptions and Syntax

Each ZipCenter command has a syntax, or rules, that describe how to use the command in your 4D database. For each command, the name of the command is followed by the command's parameters. The parameters are enclosed in parenthesis, and separated by semicolons. Following the command syntax description, an explanation of the command's parameters is provided. Optional parameters are enclosed in brackets (the “[“ and “]” characters).

For each parameter, the type of the parameter and a description is shown. Several examples are provided for each of the commands, showing examples of the syntax as well as how the various commands are used together.

Some parameters are used by ZipCenter to return a value. Do not use local variables for these parameters, because 4D doesn't support returning values from a plug-in into a local variable. Use a process or inter-process variable.

About ZipCenter

ZipCenter adds 5-digit ZIP Code data and utilities to any 4D or 4D Server database. ZipCenter is really three products in one, and includes:

- ◆ **ZipCenter Quick Lookups**

Plug-in commands and a special file for lightning fast ZIP Code lookups.

- ◆ **ZipCenter Area Searches**

Plug-in commands that perform area searches.

- ◆ **ZIP Code Basic Data Subscription**

A 5-digit ZIP Code file in both ZipCenter and ASCII-file formats. The text file may be imported into any system for any purpose. Includes fields for ZIP Code, Latitude, Longitude, City and State. See “Zip Center Lookup File Contents” on page 40 for more information.

or

- ◆ **ZIP Code Enhanced Data Subscription**

A 5-digit ZIP Code file in both ZipCenter and ASCII-text file formats. The text file may be imported into any system for any purpose. In addition to the fields included with the Basic data file, the Enhanced data file includes:

- In the ZipCenter file: fields for County, County and State FIPS Code, Area Code and whether or not secondary city names are approved.

- In the ASCII-text file: fields for County, City FIPS, County FIPS, State FIPS, Area Code, MSA Code, Time Zone, whether Daylight Savings is observed, and whether or not secondary city names are approved.

See “Zip Center Lookup File Contents” on page 40 for more information.

The plug-ins and sample code included with ZipCenter also include these features:

- ◆ Multi-process and multi-user safe code.
- ◆ Highly optimized for use under 4D or 4D Server.
- ◆ Flexible, high-performance procedural replacements for 4D's **RELATE ONE SELECTION** and **RELATE MANY SELECTION** commands.

ZipCenter Quick Lookups

Data entry is time consuming and error prone. A ZIP Code lookup system makes address entry quicker and more accurate. ZipCenter can look up any ZIP Code with almost no code. ZipCenter uses a special file on each user's machine to perform ZIP Code lookups, so query speed is as fast under 4D Server as under 4D. ZipCenter quick lookups do not require adding tables or data to your 4D database structure. The ZipCenter quick lookup system is completely independent from the area search features of ZipCenter, and does not require the ZIP Code data provided with the package.

Please read the section "ZipCenter Quick Lookups" on page 20 for more information.

ZipCenter Area Searches

ZipCenter's area search system finds all ZIP Codes within the distance you specify from a starting point. In other words, ZipCenter finds records based on proximity. ZipCenter area searching lets you answer the kinds of questions people like to ask, rather than the kind of questions databases like to answer. For example, you can use an area search to answer questions like these:

- ◆ *Find me every customer with 50 miles of our office.*
- ◆ *Find me the 7 closest doctors to this patient's house.*
- ◆ *Find me hotels that are within 10 miles of this airport.*
- ◆ *Tell me the distance between these two locations.*

These are natural and useful questions. Unfortunately, these questions are difficult or impossible to answer in a normal database. ZipCenter helps you answer these questions with only a few lines of code.

ZipCenter area searches give you a competitive advantage by allowing you to get new information out of your data. The ZipCenter area search system requires ZIP codes and their geophysical coordinates inside of your database. All of the data you need is included with the product.

Please read the section "ZipCenter Area Searches" on page 29 for more information.

ZIP Code Data

ZipCenter includes current descriptions of U.S.P.S (United States Postal Service) 5-digit ZIP Codes. You can use this data in any way you like. The ZIP Code data includes the latitude and longitude information need by ZipCenter area searches. ZIP Codes change on a regular basis, so your ZIP Code data should be updated every few months. The ZipCenter product family includes two kinds of data subscriptions. The standard package includes ZIP Code descriptions with latitude and longitude. The enhanced package adds area code, county names, state FIPS, county FIPS, and entries for all secondary cities.

Please read the section “ZIP Code Data” on page 35 for more information.

ZipCenter Use and Behavior

ZipCenter can be used with just a few commands. The example database includes numerous examples of how to apply these commands to quickly solve complex problems.

ZipCenter Requirements

Because of its implementation, ZipCenter imposes very minimal memory requirements. The ZipCenter quick lookup system requires no additional memory over standard 4th Dimension requirements.

The Mac version of ZipCenter requires 4th Dimension v3.2.5 or higher, and is compatible with databases compiled with 4D Compiler. The example database includes routines optimized for 4D 3.5.3 and higher, including 4D and 4D Server V6 and later.

On the Macintosh, ZipCenter also requires System 7.

The Windows version of ZipCenter requires 4th Dimension 3.5 or higher, and is compatible with databases compiled with the 4D Compiler.

Installing and De-Installing ZipCenter

ZipCenter Components

ZipCenter includes three components.

- ◆ **ZipCenter Plug-Ins**

The ZipCenter plug-in package includes commands to perform area searches, and quick ZIP Code lookups. Installing these plug-ins is the subject of this chapter.

- ◆ **ZipCenter Quick Lookup File**

If you use ZipCenter for local-5 digit ZIP Code lookups install the ZipCenter plug-ins as described in this chapter, and install the ZipCenter lookup file as described in “Installing ZipCenter Lookup Files” on page 21.

- ◆ **ZIP Code Data**

If you want to perform ZipCenter area searches install the ZipCenter plug-ins as described in this chapter, and import the ZIP Code data as described in “ZipCenter Area Searches” on page 29.

You can also use the ZIP Code data for general ZIP Code lookups in your system. The exact contents of the ZIP Code import file depends on your version of the ZipCenter data subscription. The data is described in detail in “ZIP Code Data” on page 35.

Installing the ZipCenter Plug-ins on the Macintosh

The ZipCenter plug-in must be installed (and de-installed) using the ZipCenter Mac4DX Library installation method described herein. Do not use the 4D External Mover or ResEdit to install or remove ZipCenter.

The file *ZipCenter v1.5* contains both 68K and Power Macintosh native code, and can be used with 4th Dimension v3.2.5 or later.

For more information about 4th Dimension plug-ins, please refer to the 4th Dimension manuals.

Installing ZipCenter

To Install ZipCenter in the Mac4DX Folder

The ZipCenter disk contains a file entitled *ZIPCNTR.4DX*. This file contains the shared library used to install ZipCenter into your 4D database. *This version can only be used with 4th Dimension v3.2.5 or later.* To install this version:

- 1 Create a folder inside the same folder as your 4D Structure file.
- 2 Make the name of this folder *Mac4DX*.
Note: Steps 1 and 2 are not necessary if the Mac4DX folder already exists.
- 3 Drag and drop the ZipCenter v1.5 file into the folder created in step 1.

De-Installing ZipCenter

De-Installing the Mac4DX version of ZipCenter

To de-install the Mac4DX version of ZipCenter, simply remove the file *ZIPCNTR.4DX* from the Mac4DX folder.

Installing ZipCenter Under Windows

To install ZipCenter from Program Manager

- 1 Insert the ZipCenter diskette in drive A:
- 2 Choose “Run” from Program Manager's “File” menu
- 3 Type a:setup (or b:setup if the disk is in drive b:)
- 4 Follow the instructions that the setup program displays to select a directory for ZipCenter

To install ZipCenter from the Windows 95/98 “Start” Menu

- 1 Insert the ZipCenter diskette in drive A:
- 2 Choose “Run” from the Windows 95/98 “Start” menu
- 3 Type a:setup (or b:setup if the disk is in drive b:)
- 4 Follow the instructions that the setup program displays to select a directory for ZipCenter

By default, Setup installs the ZipCenter files in the directory C:\ZIPCNTR. You can change the drive and directory if necessary.

Using ZipCenter for Windows With Your Database Applications

To Install ZipCenter in the WIN4DX directory, you will need the ZIPCINTR.4DX and ZIPCINTR.RSR files. These files will be loaded automatically by 4D if you put the files in the WIN4DX directory under the directory containing your structure file. To do this:

- 1** Create a a directory named WIN4DX in the directory containing your database structure file.
- 2** Copy the ZIPCINTR.4DX and ZIPCINTR.RSR files to the newly-created directory.

Configuration Commands

ZipCenter is configured using the commands described in this chapter. These commands are typically called while the 4D database is opening (via the **Startup** procedure or **On Startup** database method).

ZC_Register

ZC_Register (*Mac OS Code*; *Windows Code*) → *ResultCode*

Parameter	Type	Description
<i>Mac OS Code</i>	Text	Mac OS Registration code provided by ASG.
<i>Windows Code</i>	Text	Windows Registration code provided by ASG.

ZC_Register will, if passed a valid registration code, remove the demo restrictions from the ZipCenter plug-in.

ZC_Register should be called prior to issuing any of the other ZipCenter commands.

Mac OS Code— Text. Serial number assigned by Automated Solutions Group, provided when your ZipCenter license was purchased for Mac OS.

Windows Code— Text. Serial number assigned by Automated Solutions Group, provided when your ZipCenter license was purchased for Windows.

ResultCode — Longint. The result is 1 if the registration code is accepted and 0 otherwise.

Example

The following example will register ZipCenter on both platforms (assuming you have valid registration codes for both platforms).

```
$result:=ZC_Register("regcodeMac";"regcodeWin")
```

```
if ($result=0)  
  ALERT("ZipCenter not registered")  
End if
```

Note for Users of ZipCenter 1.5

The **ZC_Register** command changed in ZipCenter 1.6 to accept Mac OS and Windows registration codes simultaneously. If you are using an earlier version of ZipCenter, update the calls to **ZC_Register**:

Note for Users of ZipCenter Prior to 1.5

ZipCenter registration codes and the **ZC_Register** changed in ZipCenter 1.5. If you are using an earlier version of ZipCenter, update the call to **ZC_Register**:

- 1 Contact the Automated Solutions Group Sales department to obtain an updated registration code.
- 2 Use the new registration code in your call to **ZC_Register**.
- 3 Make sure that you pass only one registration code in each call to **ZC_Register**. If you are using ZipCenter on both platforms call **ZC_Register** twice, as shown in the example above.
- 4 Make sure to test the **ZC_Register** result code with the new values. This table compares the result codes from the past.

Code	Earlier version of ZipCenter	ZipCenter 1.5 and Later
0	The registration code was not accepted.	The registration code was not accepted.
1	The registration codes were accepted.	The registration code was accepted for the Mac OS.
2	<i>This result code was not returned.</i>	The registration code was accepted for the Windows platform.

ZipCenter Quick Lookups

The ZipCenter quick lookup system consists of a plug-in package for 4th Dimension, and a special file full of 5-digit ZIP Code data. You control the operation of ZipCenter quick lookups using plug-in commands which are part of the ZipCenter package.

Understanding Quick Lookups

ZipCenter is a 5-digit ZIP Code tool. The ZIP Code data for quick lookups is stored in an external file, not in your 4D database. This file can be loaded onto each user's computer for fast local lookups. The same file can be used for Windows and Mac OS without modification.

ZipCenter Quick Lookup File Contents

The ZipCenter lookup file comes in simple and enhanced versions corresponding to the data subscription you purchased. The following table describes the information stored with each ZIP Code:

Field	Type	Standard	Enhanced
ZIP Code	String (5)	√	√
Latitude	Real	√	√
Longitude	Real	√	√
Primary city	String (30)	√	√
State abbreviation	String (2)	√	√
Last modified	Date	√	√
City sequence	Longint		√
Secondary city name	String (30)		√
County name	String (30)		√
Acceptable	String (1)		√
County FIPS	String (3)		√
State FIPS	String (2)		√
Area Code	String (3)		√

If you have questions about the contents of any of these fields, see “ZIP Code Data” on page 35.

Installing ZipCenter Lookup Files

You do not import or work with this file directly. Each ZipCenter quick lookup user needs a copy of the ZipCenter lookup file on their local hard drive. The ZipCenter plug-in commands read this specially formatted file. You can place the ZipCenter lookup file anywhere you like. The ZipCenter commands require a path to the ZipCenter lookup file, but do not require you to put the file in any specific directory. If you are using 4D Server 1.2.6 or later the most convenient location for the ZipCenter lookup file is in the WIN4DX directory and MAC4DX folder on the server machine. When users connect the ZipCenter lookup file downloads automatically.

Updating ZipCenter Lookup Files

If you have purchased a ZipCenter data subscription you will receive new ZipCenter quick lookup files periodically. All you need to do is replace your user’s existing files. If you are using 4D Server’s MAC4DX and WIN4DX system the update is handled for you automatically.

ZipCenter Quick Lookups and Local Processes

ZipCenter does not read data from your database structure when it does a quick lookup; it reads data from a special external file. This means that you can safely use ZipCenter quick lookups in a local process if you do not change any data in your database. This can improve performance significantly under 4D Server. See your 4D or 4D Server documentation for more details on local processes.

ZipCenter Quick Lookup Commands

ZC_Lookup

ZC_Lookup (*File path*; *Zip Code*; *State*; *City*; *County*; *Area Code*; *Approved*; *State FIPS*; *County FIPS*; *Longitude*; *Latitude*) → *Result code*

Parameter	Type	Description
<i>File path</i>	String [255]	Path to ZipCenter lookup file.
<i>ZIP Code</i>	Longint	ZIP Code to look up.
<i>State</i>	String [2]	→ State abbreviation.
<i>City</i>	String [30]	→ Primary city name.
† <i>County</i>	String [30]	→ County name.
† <i>Area code</i>	String [3]	→ Area code.
† <i>Approved</i>	String [1]	→ USPS approved city name?
† <i>State FIPS</i>	String [2]	→ State Federal Information Processing Standards code.
† <i>County FIPS</i>	String [3]	→ County Federal Information Processing Standards code.
<i>Longitude</i>	Real	→ Longitude of center of ZIP Code.
<i>Latitude</i>	Real	→ Latitude of center of ZIP Code.

† Fields available only with the enhanced ZipCenter lookup file.

ZC_Lookup looks up a *ZIP Code* in the ZipCenter lookup file located at *File path*. The *Result code* parameter returns an error code, or a reference to additional information. The remaining parameters receive data back from ZipCenter. You should use process or interprocess variables for these parameters.

State returns a two character state abbreviation code.

City returns the primary city name for this ZIP Code.

County returns the primary county name for this zip code. (This value requires the enhanced ZipCenter data.)

Area code returns the U.S. telephone area code primarily associated with this zip code. (This value requires the enhanced ZipCenter data.)

Approved returns a one character code indicating if this city name is approved for postal delivery. The codes are A for “Approved” and N for “Not approved”. Primary cities are always approved. (This value requires the enhanced ZipCenter data)

State FIPS returns a two character FIPS code. (This value requires the enhanced ZipCenter data.)

County FIPS returns a three character FIPS code. (This value requires the enhanced ZipCenter data.)

Longitude returns a real number with the longitude of the approximate center of the ZIP Code.

Latitude returns a real number with the latitude of the approximate center of the ZIP Code.

Result code can return three different kinds of values:

- 0 <** A negative number indicates an error of some kind.
- 0** 1 means that there was no error, and that this ZIP Code has no secondary cities.
- >0** A positive number means that there was no error, and that there is a secondary city for this ZIP Code.

A negative result is an error code. See “ZipCenter Errors” on page 43 for a list of error codes with descriptions.

A result of 0 indicates that there was no problem, and that there is no secondary data.

A positive result is a reference to a secondary city entry. You retrieve secondary city data with a call to **ZC_GetMore** (page 24), and requires the enhanced ZipCenter data.

You do not need to pass the complete parameter list to **ZC_Lookup**.

This example only retrieves city and state:

```
C_LONGINT($ResultCode)
```

```
C_STRING (2;vsState)
```

```
C_STRING (30;vsCity)
```

```
vsState:=""
```

```
vsCity:=""
```

```
$ResultCode:=ZC_Lookup (vsZQPath;vZipCode;vsState;vsCity)
```

This example retrieves all of the information about a ZIP Code:

```
C_LONGINT($ResultCode)
```

```
C_STRING (2;vsState)
```

```
C_STRING (30;vsCity)
```

```
C_STRING (30;vsCounty)
```

```
C_STRING (3;vsAreaCode)
```

```
C_STRING (1;vsApproved)
```

```

C_STRING (2;vsStateFIPS)
C_STRING (3;vsCntyFIPS)
C_REAL (vrLongitude)
C_REAL (vrLatitude)

```

```

$ResultCode:=ZC_Lookup (⋄vsZQPath;vlZipCode;vsState;vsCity;vsCounty;
                        vsAreaCode;vsApproved;vsStateFIPS;vsCntyFIPS;vrLongi-
                        tude;vrLatitude)

```

ZC_GetMore

ZC_GetMore (*File path;Data reference;State;City;County;Area Code;Approved;State FIPS;County FIPS;Longitude;Latitude*) → *Result code*

Parameter	Type	Description
<i>File path</i>	String [255]	Path to ZipCenter lookup file.
<i>Data reference</i>	Longint	ZIP Code to look up.
<i>State</i>	String [2]	→ State abbreviation.
<i>City</i>	String [30]	→ Primary city name.
<i>County</i>	String [30]	→ County name.
<i>Area code</i>	String [3]	→ Area code.
<i>Approved</i>	String [1]	→ USPS approved city name?
<i>State FIPS</i>	String [2]	→ State Federal Information Processing Standards code.
<i>County FIPS</i>	String [3]	→ County Federal Information Processing Standards code.
<i>Longitude</i>	Real	→ Longitude of center of ZIP Code.
<i>Latitude</i>	Real	→ Latitude of center of ZIP Code.

ZC_GetMore looks up the secondary ZIP Code entry located at *Data reference* in the ZipCenter lookup file located at *File path*. You obtain Data reference from an earlier call to **ZC_Lookup** or **ZC_GetMore**. The *Result code* parameter returns an error code, or a reference to additional information. The remaining parameters receive data back from ZipCenter. You should use process or interprocess variables for these parameters. **ZC_GetMore** requires the enhanced ZipCenter data.

State returns a two character state abbreviation code.

City returns the primary city name for this ZIP Code.

County returns a two character state abbreviation code.

Area code returns a two character state abbreviation code.

Approved returns a one character code indicating if this city name is approved for postal delivery. The codes are A for “Approved” and N for “Not approved”.

State FIPS returns a two character FIPS code.

County FIPS returns a three character FIPS code.

Longitude returns a real number with the longitude of the approximate center of the ZIP Code.

Latitude returns a real number with the latitude of the approximate center of the ZIP Code.

Result code can return three different kinds of values:

- 0 <** A negative number indicates an error of some kind.
- 0** 1 means that there was no error, and that this ZIP Code has no more secondary cities.
- >0** A positive number means that there was no error, and that there is another secondary city for this ZIP Code.

A negative result is an error code. See “ZipCenter Errors” on page 43 for a list of error codes with descriptions.

A result of 0 indicates that there was no problem, and that there is no more secondary data.

A positive result is a reference to another secondary city entry. You retrieve secondary city data with another call to **ZC_GetMore**, as illustrated in the following example.

Example:

This example only retrieves city and state:

```
C_LONGINT($ResultCode)
```

```
C_STRING(2;vsState)
```

```
C_STRING(30;vsCity)
```

```
ARRAY STRING(2;asState;0)
```

```
ARRAY STRING(30;asCity;0)
```

```
vsState:=""
```

```
vsCity:=""
```

```
$ResultCode:=ZC_Lookup (∅vsZQPath;vZipCode;vsState;vsCity)
```

```
If ($ResultCode>0)
```

```
  ` There are secondary cities, we'll use arrays for display.
```

```
  $Element:=1
```

```
    INSERT ELEMENT(asState;$Element)
```

```
    INSERT ELEMENT(asCity;$Element)
```

```
    asState{$Element}:=vsState
```

```
    asCity{$Element}:=vsCity
```

```
  Repeat
```

```
    ` The previous $ResultCode value is the reference to the next city for this
```

```
    ` ZIP Code. If there are more secondary cities, we get another reference.
```

```
    ` If there are no more secondary cities we get a 0 back.
```

```
    $ResultCode:=ZC_GetMore (∅vsZQPath;$ResultCode;vsState;vsCity)
```

```
    ` Add another element to the arrays for the new city-state information.
```

```
    $Element:=$Element+1
```

```
    INSERT ELEMENT(asState;$Element)
```

```
    INSERT ELEMENT(asCity;$Element)
```

```
    ` Copy the data we just got into the arrays:
```

```
    asState{$Element}:=vsState
```

```
    asCity{$Element}:=vsCity
```

```
  Until ($ResultCode<1)
```

```
End if
```

ZC_GetInfo

ZC_GetInfo (*File path*; *Enhanced*; *Creation date*; *Version*) → *Result code*

Parameter	Type	Description
<i>File path</i>	String [255]	Path to ZipCenter lookup file.
<i>Enhanced</i>	Longint	→ Is this an enhanced lookup file?
<i>Creation date</i>	Date	→ Date ZipCenter lookup file was created.
<i>Version</i>	Longint	→ ZipCenter lookup file version.

ZC_GetInfo returns information about the ZipCenter lookup file at *File path*. The *Result code* parameter returns an error code, or a 0 if there was no error. The remaining parameters receive data back from ZipCenter. You should use process or interprocess variables for these parameters.

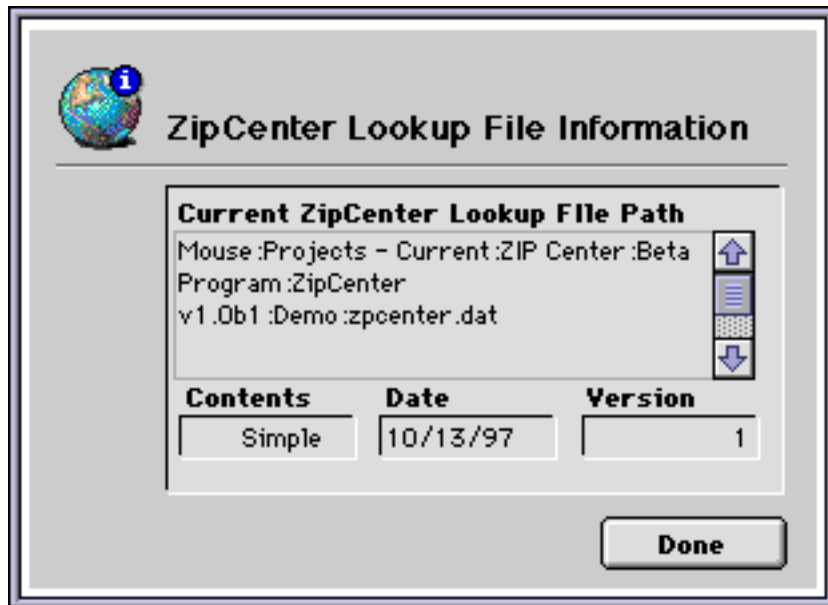
Enhanced returns a 0 if this is a standard ZipCenter lookup file, and a 1 if this is an enhanced ZipCenter lookup file.

Creation date returns the date the ZipCenter lookup file was created.

Version returns the ZipCenter lookup file version number.

Example:

```
C_LONGINT($ErrorCode)
C_LONGINT(⋄vlDataType)
C_DATE(⋄vdCreated)
C_LONGINT(⋄vlVersion)
$ErrorCode:=ZC_GetInfo (⋄vsZQPath;⋄vlDataType;⋄vdCreated;⋄vlVersion)
```



ZipCenter Area Searches

Introduction

What Does ZipCenter Area Searching Do?

ZipCenter queries your ZIP Code table for ZIP Codes within a given distance of a starting latitude and longitude. This finds records based on their relative nearness. This is often the only way to find the records you need.

With the ZipCenter area search system you can find records based on nearness—proximity—to a central point. No other 4D search system available provides this feature. People naturally think of the world geographically, but computers find this less straightforward. Here are some common examples of how to use proximity searching:

Database	Use
Hotel listings	A customer needs a hotel near downtown Minneapolis. Find the 5 closest hotels.
Pharmacists	A patient is out of town and needs a prescription refilled. Find the three closest pharmacies.
Customers	A sales person is held over in Houston unexpectedly for a day. Find all of their accounts with a 50 mile radius.
Parts	A critical part is out of stock at your regular supplier, find the next two closest suppliers.

How it Works

ZipCenter combines two precise and highly-optimized search algorithms to locate ZIP Codes within a given radius within a true circle. Distances are compared on the surface of the globe, rather than in two dimensions. This distinction becomes significant if your searches consider areas of more than a few miles. All of the necessary calculations are performed for you automatically by ZipCenter.

Required Data

ZipCenter area searches change the selection in the ZIP Code table you identify with **ZC_SetStructure**. Your ZIP Code table must contain the following fields:

Field	Data Type	Indexed
ZIP Code	String (5)	Yes
Latitude	Real	Yes
Longitude	Real	Yes

All of the data you need for 5-digit ZIP Code lookups is provided with ZipCenter. The full contents of the ZIP Code import file is described in “ZIP Code Data” on page 35.

Command Descriptions

ZC_SetStructure

ZC_SetStructure (*ZIP Code table*; *ZIP Code field*; *Longitude field*; *Latitude field*) → *Result code*

Parameter	Type	Description
<i>ZIP Code table</i>	Longint	Number of the ZIP Code file in the current database.
<i>ZIP Code field</i>	Longint	Number of the ZIP Code field in the ZIP Code file.
<i>Longitude field</i>	Longint	Number of the longitude field in the ZIP Code file.
<i>Latitude field</i>	Longint	Number of the latitude field in the ZIP Code file.

ZC_SetStructure tells ZipCenter where to look in your database structure for ZIP Code data. The ZC_FindZips command searches your database directly, and needs to know where to look for the data. This command is global in scope, so you only need to call it once.

ZIP Code table is the number of the ZIP Code table in your database structure.

ZIP Code field is the number of the ZIP Code field in the ZIP Code file. This field must be of type string with a length of 5. This field should be indexed for performance reasons.

Longitude field is the number of the longitude field in the ZIP Code file. This field must be of type real. This field should be indexed for performance reasons.

Latitude field is the number of the latitude field in the ZIP Code file. This field must be of type real. This field should be indexed for performance reasons.

Result code returns 0 if there was no problem, or an error code. Error codes are listed in “ZipCenter Errors” on page 43.

This example shows a reliable way to generate the table and field numbers you need to pass to **ZC_SetStructure**:

```
C_LONGINT($ErrorCode)
C_LONGINT($ZipTable)
C_LONGINT($ZipField)
C_LONGINT($Longitude)
C_LONGINT($Latitude)

` Get the table and field numbers needed by ZipCenter:
$ZipTable:=Table(->[ZIP_Codes])
$ZipField:=Field(->[ZIP_Codes]ZIP_Code)
$Longitude:=Field(->[ZIP_Codes]Longitude)
$Latitude:=Field(->[ZIP_Codes]Latitude)

` Tell ZipCenter which table holds your ZIP Codes, and which fields hold
` ZIP Code, longitude and latitude:
$ErrorCode:=ZC_SetStructure ($ZipTable;$ZipField;$Longitude;$Latitude)
```

ZC_FindZips

ZC_FindZips (*Latitude;Longitude;Distance;{Search in selection}*) → *Result code*

Parameter	Type	Description
<i>Latitude</i>	Real	Latitude of central point in search.
<i>Longitude</i>	Real	Longitude of central point in search.
<i>Distance</i>	Real	Distance in miles to search around central point.
<i>Search selection</i>	Longint	{Optionally you can search the current selection in the ZIP Code table.}

ZC_FindZips locates ZIP Codes that are within *Distance* of the *Latitude* and *Longitude* you specify. This command changes the selection in the ZIP Code table specified in **ZC_SetStructure**. ZipCenter uses 3-dimensional calculations for high accuracy. This command is optimized for performance under 4D or 4D Server.

You must call **ZC_SetStructure** prior to calling **ZC_FindZips**.

Latitude is the latitude of the starting point for the search.

Longitude is the longitude of the starting point for the search.

Distance is the distance in miles you want to search from the starting point. It is, in other words, the search radius.

Search selection allows you to search the current selection of ZIP Codes rather than the entire table. The default behavior is to search the entire table. Pass 1 in this parameter to search the current selection.

Result code returns 0 if there was no problem, or an error code. Error codes are listed in “ZipCenter Errors” on page 43.

Example:

This example finds ZIP Codes within 10 miles of a starting ZIP Code. The routine excludes all secondary cities from the query:

```
C_LONGINT($ErrorCode)
C_REAL($Latitude;$Longitude)
```

```
` Get the latitude and longitude of the target ZIP Code:
```

```
QUERY([ZIP_Codes];[ZIP_Codes]ZIP_Code="01778")
```

```
$Latitude:=[ZIP_Codes]Latitude
```

```
$Longitude:=[ZIP_Codes]Longitude
```

```
` Only look for primary cities, secondaries share the same lat and long.
```

```
QUERY([ZIP_Codes];[ZIP_Codes]City_sequence=1)
```

```
$ErrorCode:=ZC_FindZips ($Latitude;$Longitude;10;1)
```

Locating Data Other Than ZIP Codes

ZipCenter queries ZIP Codes, but you may want to find customers, suppliers, or other records that use ZIP Codes. Starting from the selection of ZIP Codes you can find records in any other table in your database. If, for example, your customer's table includes 5-digit ZIP Codes here's how to find all customer's within 20 miles of the ZIP Code 95014:

- 1 Make sure that you've called **ZC_SetStructure** to identify where your ZIP Code data is stored.
- 2 Call **ZC_FindZips** to find all ZIP Codes within 20 miles of ZIP Code 95014.
- 3 Use the selection of ZIP Codes to find all customers within 20 miles of 95014.

You can perform step three with built-in 4D commands if you have a relationship between the ZIP Code table and the customer's table. Here are the names of the commands to consider in 4D V3 and 4D V6:

V3	V6
PROJECT SELECTION	RELATE MANY SELECTION
JOIN	RELATE ONE SELECTION

A more flexible alternative is to use the *Free Join* routine found in the ZipCenter example database. This routine replaces the 4D commands listed above, and does not require relations between your tables.

Distance Commands

ZipCenter includes a command that calculates the distance between any two latitude-longitude pairs. These calculations are performed using 3-dimensional geometry for high accuracy results.

ZC_MilesApart

ZC_MilesApart (*Latitude1;Longitude1;Latitude2;Longitude2*) → *Distance*

Parameter	Type	Description
<i>Latitude1</i>	Real	Latitude of first point.
<i>Longitude1</i>	Real	Longitude of first point.
<i>Latitude2</i>	Real	Latitude of second point.
<i>Longitude2</i>	Real	Longitude of second point.

ZC_MilesApart calculates the distance between two points, and returns the result in miles. You can obtain latitude and longitude coordinates from any source, including the ZipCenter lookup file, or the ZIP Code import data supplied with ZipCenter.

ZC_MilesApart uses 3-dimensional geometry for high precision results.

Latitude1 is the latitude of the first point.

Longitude1 is the longitude of the first point.

Latitude2 is the latitude of the second point.

Longitude2 is the longitude of the second point.

Distance is the distance between the points in miles. The example database includes routines to convert miles to kilometers.

This example calculates the distance between two ZIP Codes:

```
C_REAL ($Lat1;$Long1;$Lat2;$Long2;$Distance)
QUERY([ZIP_Codes];[ZIP_Codes]ZIP_Code="01778")
```

```
$Lat1:=[ZIP_Codes]Latitude
$Long1:=[ZIP_Codes]Longitude
```

```
QUERY([ZIP_Codes];[ZIP_Codes]ZIP_Code="95060")
```

```
$Lat1:=[ZIP_Codes]Latitude
$Long1:=[ZIP_Codes]Longitude
$Distance:=ZC_MilesApart ($Lat1,$Long1,$Latitude_2,$Longitude_2)
```

ZIP Code Data

Introduction

ZipCenter includes two different files with ZIP Code data:

- ◆ A ZipCenter lookup file designed exclusively for use with the ZipCenter plug-in commands.
- ◆ A text file with 5-digit ZIP Code data needed for ZipCenter area searches. This file includes additional useful ZIP Code information.

Each of these files comes in two versions: standard and enhanced. The file you have depends on the ZipCenter data subscription option you purchased. This chapter describes the contents of these files, and explains what each item is for.

ZIP Code Data: Standard

The standard version of the ZipCenter data includes roughly 43,000 records. The file contains the following information about each 5-digit ZIP Code:

Field	Type	Notes
ZIP Code	String (5)	Each ZIP Code is unique.
Latitude	Real	The approximate latitude of the center of the ZIP Code.
Longitude	Real	The approximate longitude of the center of the ZIP Code.
Last modified	Date	The date ASG last updated this data.
Primary city	String (30)	Name of primary city associated with this ZIP Code.
State abbreviation	String (2)	The approximate latitude of the center of the ZIP Code.

A few of these fields deserve a bit of explanation.

Latitude and Longitude

The latitude and longitude measurements included with each ZIP Code are called a 'centroid' measurement. ZIP Codes cover areas of different sizes and shapes. The latitude and longitude are for a calculated central point.

4D Table Structure for Area Searches

You can import this data into whatever 4D table structure you like. This table describes which fields are necessary for area searches, which need indexes, and what data type to use:

Field	Type	Indexed	Unique	Necessary
ZIP Code	String (5)	√	√	√
Latitude	Real	√		√
Longitude	Real	√		√
Last modified	Date	√		
Primary city	String (30)			
State abbreviation	String (2)			

ZIP Code Data: Enhanced

The enhanced version of the ZipCenter data contains roughly 52,000 records. This file includes all of the data found in the standard version, as well as these additional fields:

Field	Type	Notes
City sequence	Longint	Distinguishes primary cities from all secondary cities.
County name	String (30)	The name of the county name associated with this ZIP Code and city.
Acceptable	String (1)	Is this city name acceptable to the U.S.P.S.?
County FIPS	String (3)	The FIPS code for this county.
State FIPS	String (2)	The FIPS code for this state.
Area Code	String (3)	The area code for this ZIP Code.
City FIPS ^a	String (5)	The FIPS code for this city.
MSA Code ^a	Longint	Metropolitan Statistical Area code
Time Zone ^a	Longint	number of hours from GMT
DST ^a	String (1)	'Y' if the area observes Daylight Savings Time

a. These fields are at this time only available in the ASCII-text file version of the Enhanced Data file.

A few of these fields deserve a bit of explanation.

City Sequence

ZIP Codes can cross city and county lines. The standard data set includes the 'primary' city. The enhanced data set includes entries for the primary, as well as any known secondary cities. A single ZIP Code may have as many as 14 secondary cities. The primary city has a city sequence number of 1.

Acceptable

Some secondary city names are commonly used local names not recognized by the U.S.P.S. People may give you an unacceptable secondary city name as their mailing address. With the ZipCenter data you can locate cities as people call them, and address them as the Post Office expects.

City, State and County FIPS Codes

What is a FIPS code, and why would you care? FIPS stands for Federal Information Processing Standards (but you knew that). FIPS is a National Institute of Standards and Technology program to achieve compatibility and interchangeability among data systems. Many useful data products from commercial and government sources include FIPS codes. You can, for example, purchase data that describes the average income and education level associated with each county FIPS code. If you do not intend to work with other data sets, you normally do not need the FIPS codes in your database.

These codes may not be available for APO, FPO and some U.S. Territories.

MSA Codes

MSA stands for Metropolitan Statistical Area codes. They define greater metropolitan areas, such as the greater Miami area. Not all zip codes have an MSA code because many zip codes are in rural areas

Time Zone

U.S. time zones are expressed here in a standard format which is the number of hours from Greenwich Mean Time (GMT). West of GMT is negative and so all U.S. records have negative numbers. The numbers range from -5 (Eastern Standard Time) to -10 (Hawaii).

Daylight Savings time

'Y' if the area observes Daylight Savings Time and 'N' if it doesn't

4D Table Structure for Area Searches

The ZipCenter database and import file use a flat-file format to deliver the data. They do not use a relationally correct structure. This table describes which fields are necessary for area searches, which need indexes, and what data type to use:

Field	Type	Indexed	Unique	Necessary
ZIP Code	String (5)	√	√	√
Latitude	Real	√		√
Longitude	Real	√		√

Field	Type	Indexed	Unique	Necessary
Primary city	String (30)			
State abbreviation	String (2)			
City sequence	Longint	√		√
County name	String (30)			
Acceptable	String (1)			
County FIPS	String (3)			
State FIPS	String (2)			
Area Code	String (3)			

If you want to normalize this data in your system here is a formal description of the tables you need, followed by a picture of a 4D implementation.

ZIP Code Table

Field	Type	Keys
ZIP Code	String (5)	Primary key
Latitude	Real	
Longitude	Real	
State abbreviation	String (2)	Foreign key: State table
Area code	String (3)	

County Table

Field	Type	Keys
County FIPS	String (2)	Primary key
County name	String (30)	

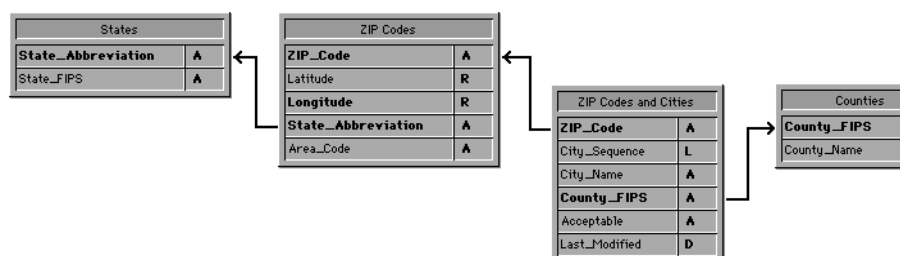
State Table

Field	Type	Keys
State FIPS	String (2)	Primary key
State name	String (2)	

ZIP Codes and Cities Table

Field	Type	Keys
ZIP Code	String (5)	Primary key, part 1 Foreign key: ZIP Code table
City sequence	Longint	Primary key, part 2
City name	String (30)	
County FIPS	String (3)	Foreign key: County table
Acceptable	String (1)	
Last modified	Date	

Here is one way to implement this in 4D:



Zip Center Lookup File Contents

The ZipCenter lookup file comes in standard and enhanced versions corresponding to the product you purchased. The contents of the ZipCenter lookup file are the same as the flat-file import file. The following table describes the information stored with each ZIP Code:

Field	Type	Standard	Enhanced
ZIP Code	String (5)	√	√
Latitude	Real	√	√
Longitude	Real	√	√
Primary city	String (30)	√	√
State abbreviation	String (2)	√	√
Last modified	Date	√	√

Field	Type	Standard	Enhanced
City sequence	Longint		√
Secondary city name	String (30)		√
County name	String (30)		√
Acceptable	String (1)		√
County FIPS	String (3)		√
State FIPS	String (2)		√
Area Code	String (3)		√

Troubleshooting

This chapter lists several common problems, and their solutions, encountered when working with ZipCenter.

When trouble-shooting a problem, use all of the tools at your disposal, including the 4D debug window. Many problems can be quickly resolved by stepping through each line of code, and checking the values of variables and arrays.

Quick Lookups

When I try to do a quick lookup, I get error -93 back from ZipCenter.

Error -93 indicates that the ZIP Code could not be found in the ZipCenter lookup file. This happens when the ZIP Code does not exist, or when you haven't selected a ZipCenter lookup file. Make sure that you have selected a ZipCenter lookup file.

Serial Numbers

My ZipCenter serial number doesn't work.

Make sure that you have entered the serial number exactly as it was provided. It's easy to confuse characters like 0 (zero) and O (the letter O). If you received your serial number via email, cut and paste it into your 4D procedure or view it in a serif font that will more easily display the differences between characters. Also, all serial numbers follow the format "xxx-nnnnn-nnnn", where x represents an alphabetic character (A-Z and a-z) and the n represents a numeral (0-9). Serial numbers will never place alphabetic characters in the areas indicated as numbers, or vice-versa. Serial numbers are case-sensitive.

Sometimes my serial number works, other times I'm told I'm in demo mode.

The ZipCenter plug-ins go into demo mode automatically after your database has been running for 10 minutes. To avoid this call "ZC_Register" once at startup. Call this command before calling any other ZipCenter command.

ZipCenter Errors

The following table explains the error codes that ZipCenter may return.

Error	Description
-99	File may be locked or volume full.
-98	File not found.
-97	File system error.
-96	File input-output error.
-95	Internal 4D error.
-94	Bad structure preference settings.
-93	ZIP Code not found.
-92	Memory error.
-91	File input-output error.
-90	Secondary data not available for passed reference. You need the enhanced ZipCenter lookup file.
-89	General exception.
-88	Opened with unmatched version of data file.
-87	Need to set preferences with ZC_SetStructure
-86	A bad file reference passed to ZC_SetStructure

Technical Support

Automated Solutions Group provides free technical support for all registered users via electronic mail, telephone or standard mail. Primary support is offered via electronic mail.

Electronic Mail

support@asgsoft.com US Customers

World Wide Web

<http://www.asgsoft.com>

<ftp://ftp.asgsoft.com>

Our WWW server provides a variety of additional information, including FAQ's (Frequently Asked Questions) and our exclusive Technical Notes as well as demo versions of other Automated Solutions Group products.

ZipCenter Demo

Introduction

Use the ZipCenter Demo database to experiment with ZipCenter's various features. Feel free to use any of the procedures in your own code; there are several useful routines included.

Once you purchase ZipCenter, you can use **ZC_Register** (page 18) to register the use of the ZipCenter external within the demo database. Until you do this, the external will run in demo mode, which means that after ten minutes, it will time-out, and you'll have to relaunch the database in order to continue using the demo.

Overview

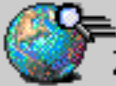
The ZipCenter demonstration database examples illustrate how ZipCenter works, and provide useful 4D code for use in your systems. Every command and feature in ZipCenter is illustrated in the example database. There are five demonstration areas in the database:

Demos	
ZIP Code Lookup	⌘1
Area Search	⌘2
Distance Calculator	⌘3
Edit Customers	⌘4
View ZIP Codes	⌘5

ZipCenter Quick Lookup

This demonstration uses **ZC_Lookup** and **ZC_GetMore** to look up ZIP Codes in a ZipCenter lookup file.

ZipCenter Quick Lookup



ZipCenter Quick Lookup



Look up any 5-digit ZIP Code from a local file. This is nearly instantaneous, even under 4D Server.

ZIP Code : 01778

 Find...

Standard Data

City

Wayland

State

MA

Latitude

42.3612

Longitude

-71.36388

Enhanced Data

County

Middlesex

FIPS

017

State FIPS

25

Approved

A

Area Code

508

There are multiple cities with this ZIP Code.
Secondary cities are in the enhanced lookup file.

Done

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You can set the path to the ZipCenter lookup file at any time by selecting Pick Lookup File from the File menu.



Zip Center Area Search

The area search demo uses ***ZC_FindZips*** to locate ZIP Codes within a given radius of a starting ZIP Code. The system automatically finds customers with matching ZIP Codes.

Optionally you can ask the system to show the distance between the starting ZIP Code and each matching ZIP Code.

Distance Calculator

The distance calculator uses the ***ZC_MilesApart*** command to calculate the distance between two ZIP Codes.

ZipCenter Area Search



ZipCenter Area Search

ZipCenter includes highly optimized routines to accurately locate ZIP Codes around a starting point. Enter a distance, a ZIP Code and press "Find..."

Find ZIP Codes within

Miles

▼

of ZIP Code

☐ Search in current selection

☐ Show Distances

 Find...

ZIP Code	City	State	Latitude	Longitude

0 ZIP Code(s) selected.

Sort By ZIP_Code ▼

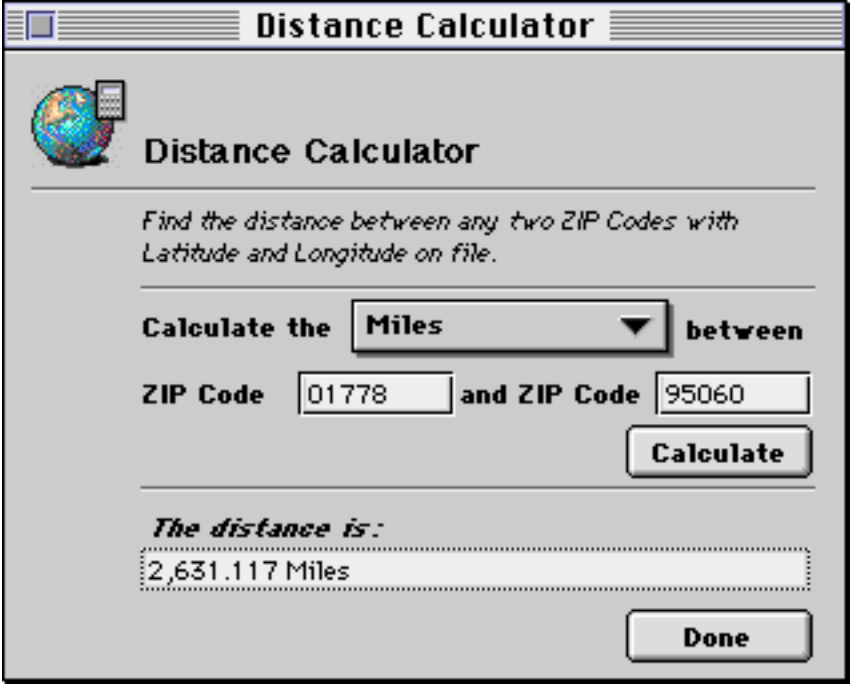
After you perform a distance search ZIP Center includes routines that quickly locate matching addresses in any file in your database.

Company	City	State	ZIP Code

0 Customer(s) selected.

Done

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A screenshot of a Windows-style application window titled "Distance Calculator". The window has a standard title bar with a minimize button, a maximize button, and a close button. Inside the window, there is a small icon of a globe with a ruler. Below the icon, the title "Distance Calculator" is repeated. A descriptive text reads: "Find the distance between any two ZIP Codes with Latitude and Longitude on file." The main input area contains the text "Calculate the" followed by a dropdown menu set to "Miles", then the word "between". Below this, there are two input fields for ZIP codes: the first contains "01778" and the second contains "95060", separated by the text "and ZIP Code". To the right of these fields is a "Calculate" button. Below the input fields, the text "The distance is:" is followed by a text box containing "2,631.117 Miles". At the bottom right of the window is a "Done" button.

Distance Calculator

Find the distance between any two ZIP Codes with Latitude and Longitude on file.

Calculate the **Miles** between

ZIP Code and ZIP Code

Calculate

The distance is:

Done

Edit Customers

The edit customers demonstration lets you view and edit customer records. The ZIP Code field on the input form uses ***ZC_Lookup*** to find a ZIP Code's primary city and state.

Customers : 63 of 63

 **Customers**

Address

Company
Bayview Clothes

Address
45 Central ave

<i>City</i>	<i>St</i>	ZIP Code
Houston	TX	77035

Previous **Next** **Cancel** **OK**

View ZIP Codes

The view ZIP Codes demonstration displays the ZIP Codes in the database for your convenience.

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ZipCenter Command Reference — Alphabetical

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